Mississippi Transitional Refresher Course
Advanced Cardiac Resuscitation
Course Outline

Minimum course length 8 hours

1. Overview of prehospital cardiac care
    1. General
        1. Potential impact on mortality and morbidity
        2. Importance of prompt intervention in acute myocardial events
        3. Importance of calm and systematic approach to assessment and management
    2. Interpersonal skills/bedside manner
        1. Establishing rapport with patient and family
        2. Communicating effectively with patient
            1. Eliciting symptoms, concerns, etc.
            2. Quantitating pain
    3. Assessment
        1. Perfusion status
            1. Level of consciousness and orientation
            2. Pulse
            3. Color of mucosa
            4. Vital signs
            5. O2 saturation (if available)
            6. ECG
        2. Breath sounds
            1. Importance of thorough assessment in quiet environment
        3. Hydration status
            1. Dependent edema

2. Ascites
3. JVD
4. Hepatojugular reflux

4. History and medications

1. Previous cardiovascular disease

2. Known diagnoses

3. Current medications

1. Nitrates
2. Beta blockers
3. Calcium channel blockers
4. ACE inhibitors

5. General management

1. Calm and reassure patient

1. Allays anxiety and reduces circulating catecholamines

2. Treatment should begin promptly where the patient is encountered

1. Risk of deterioration during move to ambulance

2. Unacceptable to wait until patient moved to ambulance to begin treatment.

3. Suspected myocardial ischemia/infarction should be treated aggressively

4. Oxygen, IV, ECG

5. Disease specific treatments

2. Cardiac disease states

1. Angina

1. Epidemiology

2. Morbidity/mortality

3. Initial Assessment Findings

1. Typical vs atypical presentation
2. Anginal equivalents

4. Focused History

    1. Myocardial disease
    2. Hypertension
    3. Peripheral vascular disease
    4. Precipitating events

5. Current medications

    1. Nitrates
    2. Beta blockers
    3. ACE inhibitors
    4. Calcium channel blockers
    5. Cardiac glycosides

6. Detailed physical exam

    1. Perfusion status
    2. Breath sounds
    3. Heart sounds
    4. Hydration status

7. Management

    1. Calm and reassure

    2. Limit activity

        (1) Patient should be kept at rest (not allowed to walk)

    3. Position of comfort

    4. Pharmacologic

        (1) Oxygen
        (2) Nitrates
        (3) Antiarrhythmics

    5. Communications and transfer of data to receiving physician

    6. Transport

    7. Management of refusals

(1) Support and communications strategies
(2) Determine need for transport
(3) Counseling and referral

2. Acute myocardial infarction

1. Epidemiology

2. Morbidity/mortality

1. Risk of sudden cardiac death highest during first hour
2. Treatment must be geared toward preventing that end

3. Initial assessment findings

4. Focused history

5. Current medications

1. Nitrates
2. Beta blockers
3. ACE inhibitors
4. Calcium channel blockers
5. Other

6. Detailed physical exam

1. General appearance

2. Perfusion status

3. Evidence of excessive sympathetic tone

(1) Increased myocardial oxygen demand
(2) Benefits of treatment

4. Evidence of excessive parasympathetic tone

(1) Clinical significance
(2) Role in preserving myocardium

7. Management

1. Calm and reassure

2. Limit activity
3. Position of comfort

4. Continuous ECG monitoring

5. Pharmacologic

    (1) Oxygen

    (2) Treat arrhythmias if indicated

        (1) Significant tachycardia or bradycardia may induce angina/AMI

    (3) Nitrates

        (1) Therapeutic vs diagnostic role

    (4) Aspirin

    (5) Analgesia

        (1) Morphine
        (2) Mepridine
        (3) Fentanyl
        (4) Other narcotics

    (6) Antiarrhythmics

    (7) The 12 lead ECG

        (1) Role in prehospital care
        (2) Application/technique
        (3) Interpretation overview
        (4) FAXing to receiving hospital

    (8) Thrombolytic screening

        (1) Potential benefits

    (9) Other

        (1) Beta blockers
        (2) ACE inhibitors
        (3) Antihypertensives
        (4) Thrombolytic therapy

6. Electrical

(1) Defibrillation/ synchronized cardioversion
(2) Transcutaneous pacing

7. Transport

(1) Stabilize before transport

(2) Criteria for emergent transport

(1) No relief with medications
(2) Hypotension/ hypoperfusion
(3) Significant changes in ECG

8. Communications and transfer of data to receiving physician

9. Management of refusals

(1) Support and communications strategies
(2) Involvement of patient, family, significant others

3. Congestive heart failure/pulmonary edema

1. Epidemiology

2. Review of pathophysiology

1. Left ventricular failure
2. Primary right ventricular failure (cor pulmonale)
3. Mixed failure

3. Morbidity/mortality

4. Initial assessment findings

1. Early
2. Late

5. Focused history

1. Dyspnea/PND/orthopnea
2. Weight gain
3. Clothing/shoes too tight
4. Non-productive cough

6. Detailed physical exam

    1. Perfusion status

    2. Hydration status

        (1) Breath sounds
        (2) Dependent edema
        (3) Ascites
        (4) JVD
        (5) Hepatojugular reflux

    3. Heart sounds

7. Management

    1. Airway control

    2. Calm and reassure

    3. Limit activity

    4. Position

    5. Peripheral vasodilators

        (1) Nitrates
        (2) Morphine

    6. Diuretic

    7. Inotropes

4. Dissecting thoracic aneurysm

    1. Epidemiology

    2. Review of pathophysiology

    3. Morbidity/mortality

    4. Initial assessment findings

        1. Early
        2. Late

5. Focused history

    1. Onset and progression of pain
    2. Malignant hypertension
    3. Family history
    4. Genetic disorders

6. Detailed physical exam

    1. Pulsating mass
    2. Pulse asymmetry
    3. Perfusion of extremities
    4. Neuro status in extremities

7. Management

    1. Calm and reassure

    2. Limit activity

    3. Position

    4. Decrease BP To low normal range

        (1) Beta blockers

            (1) Labetalol
            (2) Esmolol

    5. Acute decompensation

        (1) Fluids
        (2) Vasopressors
        (3) Rapid transport

5. Cardiogenic shock

    1. Epidmiology

    2. Review of pathophysiology

    3. Mortality and morbidity

    4. Initial assessment

5. Focused history

6. Detailed physical examination

7. Management

    1. Position of comfort

    2. Placing patient in sitting position with legs dangling may speed recovery

    3. Fluid challenge (only if chest dry)

    4. Pharmacological

        (1) Oxygen
        (2) Inotropic agents
        (3) Vasopressors
        (4) Analgesia
        (5) Diuretics
        (6) Glycoside
        (7) Alkalinizing agent
        (8) IACD
        (9) Other

    5. Transport

    6. Management of refusals

    7. Support and communications strategies

        (1) Explanation for patient, family, significant others

        (2) Communications and transfer of data to the receiving physician

6. Valvular diseases

    1. Epidemiology

        1. Mitral valve disorders
        2. Aortic valve disorders
        3. Idiopathic hypertrophic subaortic stenosis

    2. Review of pathophysiology

3. Morbidity/mortality
4. Initial assessment findings

    1. Early
    2. Late

5. Focused history

    1. Onset and progression of pain
    2. Hypertension
    3. Family history

6. Detailed physical exam

    1. Hydration status

    2. Heart sounds

        (1) Murmurs
        (2) Clicks

    3. Perfusion status

7. Management

    1. Calm and reassure
    2. Limit activity
    3. Position
    4. Oxygen
    5. Continuous cardiac monitoring
    6. Treat supportively

7. Cardiac (pericardial) tamponade

    1. Review of pathophysiology

        1. Trauma
        2. Medical

    2. Mortality/morbidity

    3. Initial assessment

    4. Focused history

    5. Detailed physical examination

1. Distant/muffled heart tones
2. Electrical alternans of ECG

6. Management

    1. Airway management and ventilation

    2. Circulation

        (1) Fluids
        (2) Pharmacologic

    3. Pericardiocentesis

        (1) Rapid transport if procedure cannot be performed in the field

7. Support and communications strategies

8. Explanation for patient, family, significant others

9. Communications and transfer of data to the physician

8. Hypertensive emergencies

    1. Review of pathophysiology

    2. Epidemiology and precipitating causes

    3. Mortality/morbidity

    4. Types

        1. Hypertensive encephalopathy
        2. Stroke and TIA
        3. Aortic aneurysm

    5. Initial assessment

        1. ABCs

        2. Focused history

        3. Chief complaint

4. Medication history
5. Detailed physical examination

    (1) Cardiovascular
    (2) Neurologic

6. Management

    (1) Position of comfort

    (2) Airway and ventilation

    (3) Pharmacologic

        (1) Oxygen

        (2) Blood pressure lowering agents

            1. Pros and cons of lowering blood pressure
            2. Beta blockers
            3. Hydralazine
            4. Calcium channel blockers

    (4) Indications for rapid transport

    (5) Management of refusal

    (6) Support and communications strategies

    (7) Explanation for patient, family, significant others

    (8) Communications and transfer of data to the receiving physician

9. Peripheral vascular disease

    1. Deep vein thrombosis

        1. Review of pathophysiology

        2. Epidemiology

        3. Mortality/morbidity

        4. Risk factors/precipitating events

(1) Prolonged bed rest or immobilization
(2) Trauma

(3) Surgery

(4) Hypercoagulability

(5) Decreased perfusion

(1) CHF
(2) Shock

(6) Diabetes

(7) Pregnancy

(8) Obesity

(9) Smoking

(10) Hypertension

5. Initial assessment

(1) ABCs

(2) Focused history

(3) Chief complaint

(4) Medication history

(5) Detailed physical examination

(1) Cardiovascular
(2) Neurologic

6. Management

(1) Position of comfort

(2) Airway and ventilation

(3) Pharmacologic

(4) Indications for rapid transport

(5) Management of refusal

(6) Support and communications strategies

(7) Explanation for patient, family, significant others

(8) Communications and transfer of data to the receiving physician

2. Pulmonary embolus

1. Review of pathophysiology

2. Epidemiology

3. Mortality/morbidity

4. Initial assessment

(1) General appearance
(2) Dyspnea
(3) Central cyanosis
(4) Breath sounds
(5) Perfusion status
(6) Oxygen saturation

5. Focused history

(1) Previous thrombosis/embolus

(2) Risk factors

(1) Any type of peripheral vascular disease

1. Most cases originate with emboli formed in the lower extremities

(2) Hypercoagulation states

(3) Peripheral vascular disease

(4) Recent trauma or surgery

(5) Prolonged immobilization or inactivity

(6) Atrial fibrillation

(7) Smoking

(8) Birth control pills

6. Physical exam

(1) Airway and breathing
(2) Perfusion status
(3) Distal pulses
(4) ECG

7. Management

(1) Airway and breathing
(2) IV, oxygen, ECG
(3) Fluid bolus
(4) Rapid transport

3. The patient with arrhythmia

1. Assessment

1. Chief complaint

2. Associated complaints

3. History

4. Physical examination

1. General appearance
2. Perfusion status
3. Vital signs
4. Breath sounds
5. Hydration status

5. Presence/absence of cardiovascular disease

2. Determine acuity level and develop treatment plan

3. Ectopy

1. Significance

1. Supraventricular
2. Ventricular
3. Presence/absence of cardiovascular disease

2. Management

1. Stable/unstable

(1) Supraventricular
(2) Ventricular

4. Tachycardias

1. Narrow complex (except atrial flutter/atrial fibrillation)

1. Determining stable vs unstable

(1) Consider age and comorbid factors when making determination

(2) Perfusion status

(3) Symptoms

(1) Chest pain
(2) Dyspnea
(3) Decreased level of consciousness

2. Types

(1) Junctional
(2) Multifocal atrial tachycardia
(3) Undifferentiated PSVT

3. Management

(1) Unstable

(1) Immediate cardioversion - 100, 200, 300 360 joules

(2) Stable

(1) Vagal manuevers

(2) Adenosine 6 mg rapid IVP - May repeat 12 mg after 5 minutes; may repeat 12 mg after additional 5

minutes

(3) Stable with significant comorbid factors or advanced age

(1) Treat as stable—but consider cardioversion if prompt conversion doesn't occur

(4) Tachycardia unresponsive to above treatment

(1) Junctional tachycardia - Consider amiodarone 5 mg/kg over 20-60 minutes

(2) Undifferentiated SVT

1. Consider amiodarone 5 mg/kg over 20-60 minutes

2. Consider diltiazem 0.25 mg/kg over 2 minutes

(3) Multifocal atrial tachycardia

1. Consider amiodarone 5 mg/kg over 20-60 minutes

2. Consider dialtiazem 0.25 mg/kg over 2 minutes

2. Narrow complex (atrial fibrillation or atrial flutter)

1. Determining stable vs unstable

(1) Consider age and comorbid factors when making determination

(2) Perfusion status

(3) Symptoms

(1) Chest pain
(2) Dyspnea
(3) Decreased level of consciousness

2. Management

(1) Unstable

(1) Immediate cardioversion - 100, 200, 300, 360 joules

(2) Stable

(1) Diltiazem 0.25 mg/kg over 2 minutes

1. May repeat after 20 minutes at 0.35 mg/kg over 2 minutes

(2) Labetalol 10 mg over 2 minutes

3. Wide complex

1. Determining stable vs unstable

(1) Clinical status of patient
(2) Stability of rhythm

2. Types

(1) Ventricular tachycardia
(2) Supraventricular tachycardia with abberant conduction
(3) Electrolyte disturbances
(4) Ventricular hypertrophy

3. Management

(1) Unstable with pulse

(1) Immediate cardioversion - 200, 300, 360 joules

(2) Amiodarone 5 mg/kg over 20-60 minutes OR

(3) Lidocaine 1 mg/kg

(2) Unstable without pulse

(1) Treat as ventricular fibrillation

(3) Stable

(1) Lidocaine 1 mg/kg OR

(2) Procainamide 20 mg/minute to maximum of 17 mg/kg

(4) Hang infusion with drug leading to conversion

(1) Lidocaine 2-4 mg/minute
(2) Procainamide 1-2 mg/minute

(5) Transport

5. Bradycardias

1. Determining stable vs unstable

1. Mental status
2. Hemodynamic status

2. Types

1. Sinus

(1) Sinus bradycardia
(2) Sinus arrhythmia
(3) Sinus pauses
(4) Sinoatrial exit block

2. Escape rhythms

(1) Junctional
(2) Ventricular

3. AV blocks

(1) First degree
(2) Second degree type I
(3) Second degree type II
(4) Third degree

4. Pulseless electrical activity

5. Asystole

3. Management

1. Unstable

(1) Oxygen, IV, ECG

(2) Atropine .5-1 mg IV - DO NOT give for wide 2^{nd} degree type II or 3^{rd} degree block

(3) Transcutaneous pacing

(4) Dopamine infusion

(1) Begin at 5 ug/minute and titrate upward until desired effect is obtained. Maximum dose is 20 ug/kg/minute.

(5) Transport

2. Stable

(1) Oxygen, IV, ECG
(2) Monitor perfusion status and ECG closely
(3) Transport

4. Cardiac arrest

1. Review of pathophysiology

1. Rapidity of cellular degradation

2. Epidemiology and risk factors

3. Initial assessment

1. Airway and breathing
2. Circulation

4. Focused history

1. History of present illness
2. Clues to immediate cause of arrest

5. Management

1. Ventricular fibrillation

1. Immediate defibrillation @ 200/300/360 joules

2. CPR (pause only for defibrillation or patient movement)

3. Insure adequate air movement

(1) Do not hyperinflate lungs—this may result in insufflation of

stomach

4. Insert ET tube and confirm position

    (1) Attach CO2 detector

5. IV in large vein

6. Vasopressin 40 units IV X 1 OR

7. Epinephrine 1 mg IV (2 mg ET) - Repeat every 5 minutes for duration of cardiac arrest (If vasopressin is used – epinephrine may be started 15 minutes after the vasopressin)

8. Defibrillate 360 joules

9. Antiarrhythmic

    (1) Amiodarone

        (1) 300 mg IV push (repeat dose 150 mg) OR

    (2) Lidocaine

        (1) 1.5 mg/kg (repeat dose .5 mg/kg) first available route

10. Defibrillate @ 360 joules

11. Repeat amiodarone or lidocaine

12. Consider sodium bicarbonate 1 meq/kg

13. Consider procainamide 20 mg/min to max of 17 mg/kg

14. Hang infusion of corresponding drug if patient responds to bolus of lidocaine or procainamide

    (1) Lidocaine 2-4 mg/minute
    (2) Procainamide 1-4 mg/minute

2. Asystole

    1. CPR (pause only for patient movement)

    2. Insure adequate air movement

(1) Do not hyperinflate lungs—this may result in insufflation of stomach

3. Insert ET tube and confirm position

(1) Attach CO2 detector

4. IV in large vein

5. Epinephrine 1 mg IV or 2 mg ET

6. Atropine 1 mg IV or 2 mg ET

7. Consider termination if 20 minutes of resuscitation proves unsuccessful

8. Outcome statistics

3. PEA

1. CPR (pause only for patient movement)

2. Insure adequate air movement

(1) Do not hyperinflate lungs—this may result in insufflation of stomach

3. Insert ET tube and confirm position

(1) Attach CO2 detector

4. IV in large vein

5. Fluid challenge (20 cc/kg)

6. Epinephrine via first available route

7. Atropine 1 mg IV or 2 mg ET

8. Identify and correct potential causes

9. Consider termination if 20 minutes of resuscitation proves unsuccessful

4. Ventricular tachycardia (with pulse)

1. Adequate perfusion status

(1) Amiodarone 300 mg IV - May repeat 150 mg after 5-10 minutes if needed OR

(2) Procainamide 20 mg/minute to max of 17 mg/kg

2. Inadequate perfusion status

(1) Synchronized cardioversion

(1) Begin at 200 joules

(2) If unsuccessful increase to 300, then to 360 joules

(3) Amiodarone 150 mg OR

(4) Lidocaine .5-.75 mg/kg - If rhythm converts—hang lidocaine infusion at 2-4 mg/min

5. Pulseless ventricular tachycardia

1. Treat as ventricular fibrillation

5. Interhospital Transport of the Cardiac Patient

1. Responsibilities

1. Must be knowledgeable of patient condition and needs prior to accepting responsibility

2. Must have equipment and personnel necessary to manage the patient's condition

3. Must have orders (standing or verbal) for anticipated needs during transport

2. Unstable angina or acute myocardial infarction

1. Frequent assessment of airway, breathing and perfusion status
2. Record vital signs every 10-15 minutes for acutely ill patients
3. Continuous ECG monitoring
4. Continuous monitoring of oxygen saturation (if available)

3. Specific conditions/situations

1. Nitroglycerine infusion

    1. Indications

        (1) Unstable/preinfarction angina

    2. Technique

        (1) Continuous infusion

    3. Dose

        (1) Infusion will be started prior to arrival of EMS

        (2) Dose range 10-20 ug/minute (may be titrated higher in some patients)

    4. Maintenance

        (1) If chest pain recurs or worsens

            (1) Increase infusion rate 2 ug every 5 minutes so long as BP remains in normal-low normal range.

        (2) If hypotension develops administer fluid challenge

            (1) Administer fluid challenge

            (2) If patient remains hypotensive after fluid challenge decrease rate of nitroglycerine infusion

2. Glycoprotein IIb/IIIa inhibitors

    1. Overview

        (1) Inhibit platelet aggregation.

        (2) Used to prevent clot formation in patients with unstable angina and non-Q wave myocardial infarction

    2. Indications

        (1) Unstable angina
        (2) Non-Q wave myocardial infarction

3. Specific drugs and doses
   (1) ReoPro
      (1) 0.25 mg/kg over 10-60 minutes
      (2) 0.125 ug/kg/minute infusion
   (2) Integrillin
      (1) 180 ug/kg loading dose over 1-2 minutes
      (2) 2 ug/kg per minute infusion
   (3) Aggrastat
      (1) 0.4 ug/kg loading dose over 30 minutes
      (2) 0.1 ug/kg per minute infusion

3. Beta blockers

   1. Overview
      (1) Negative chronotropic effect on the myocardium
      (2) Decreases myocardial oxygen demand
      (3) Helps prevent the evolution of AMI
      (4) Helps prevent the spread of infarction during AMI
      (5) Suppresses ventricular irritability and arrhythmias

   2. Indications
      (1) Myocardial ischemia unresponsive to nitrates
      (2) Myocardial infarction
      (3) Ventricular arrhythmias secondary to increased sympathetic tone

   3. Specific drugs
      (1) Labetalol
         (1) 10 mg IV push over 1-2 minutes - May repeat 10-20 mg every 10 minutes to a maximum of 150 mg OR
         (2) 10 mg IV push over 1-2 minutes - Follow with infusion at 2-8 ug/minute
      (2) Metoprolol
         (1) 15 mg at rate of 5 mg per minute

(3) Atenolol

(1) 5 mg over 5 minutes - May repeat once after 10 minutes

4. Thrombolytic agents

1. Overview

(1) Dissolve existing clots within the coronary arteries
(2) Reestablish perfusion of the myocardium
(3) Timeliness
(4) Risks vs benefits

2. Indications

(1) Acute myocardial infarction

(1) ST elevation > 1 mm in more than 2 contiguous leads

(2) New bundle branch block

(3) Other indications of AMI

3. Specific drugs

(1) Activase/tPA

(1) 15 mg IV bolus followed by 0.75 mg/kg over next 30 minutes followed by 0.5 mg/kg over next 60 minutes

(2) Streptokinase

(1) 1.5 million units in infusion administered over 60 minutes

(3) Tenecteplase (TNKase)

(1) 30-50 mg bolus

(4) Reteplase (Retevase)

(1) 10 units over 2 minutes - Wait 30 minutes then give

second 10 unit bolus over 2 minutes

(5) Anistreplase

(1) 30 units IV over 5 minutes